

# Operation and Maintenance Manual



**Model No. IX1500/IX1500L/IX1500NC**  
INDIRECT CONSTRUCTION HEATER  
1,500,000 Btu/h



**Retain these instructions for future reference.**

## **⚠ WARNING**

Read and follow all installation, and operating instructions before first use of this product.

Sure Flame Products  
A Division of Haul-All Equipment  
4115 - 18 Avenue North  
Lethbridge, Alberta T1H 5G1  
[www.sureflame.com](http://www.sureflame.com)

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## **GENERAL HAZARD WARNING**

**Failure to comply with the precautions and instructions provided with this heater, can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning, and/or electrical shock.**

**Only persons who can understand and follow the instructions should use or service this heater.**

**If you need assistance or heater information such as an instruction manual, labels, etc. Contact the manufacturer.**



## **WARNING**

**Fire, burn, inhalation, and explosion hazard. Keep solid combustibles, such as building materials, paper or cardboard, a safe distance away from the heater as recommended by the instructions. Never use the heater in spaces which do or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles or unknown chemicals.**



## **WARNING**

**Not for home or recreational vehicle use.**

## Read this Warning First

This heater is designed and approved for use as a construction heater under ANSI Z83.7-2011/CSA 2.14-2011. The primary purpose of construction heaters is to provide temporary heating of buildings under construction, alteration, or repair and to provide temporary emergency heat. Properly used, the heater provides safe economical heating. Since the products of combustion are released, it is imperative that the flue stack is extended outside of the enclosed area when the heater is positioned indoors.

This heater is not designed as an Unvented Gas Fired Room Heater under ANSI-Z21.11.2 and should not be used in the home. ANSI A119.2(NFPA 501C)-1987 Recreational Vehicle Standard prohibits the installation or storage of LP-Gas containers even temporarily inside any recreational vehicle. The standard also prohibits the use of Unvented Heaters in such vehicles.

**Installation must comply with local codes, or in the absence of local codes, with the *National Fuel Gas Code ANSI Z223.1/NFPA 54* and the *Standard for the Storage and Handling of Liquefied Petroleum Gases ANSI/NFPA 58*.**

**Gas inspection authorities in Canada require that the installation and maintenance of heaters and accessories be accomplished by qualified gas fitters.**

**Installation must comply with local codes, and with the Natural Gas and Propane Installation Code CSA-B149.1.**

We cannot anticipate every use which may be made for our heaters. CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT LOCAL REGULATIONS.

Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these

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# Specifications

## IX1500/IX1500L

### Fuel

Natural Gas  
Vapour Propane

### Input Capacity

Maximum: 1,500,000 Btuh (440 kWh)  
Minimum: 1,150,000 Btuh (337 kWh)

### Inlet Pressure

Maximum 5 psi (35 kPa)  
Minimum 9" W.C. (2.2 kPa)

### Manifold Pressure

Altitude	Natural Gas		Propane	
	Max	Min	Max	Min
0' - 2000'	4.4" (1100 Pa)	4.0" (1000 Pa)	3.9" (975 Pa)	3.7" (925 Pa)
2500'	4.2" (1050 Pa)	3.8" (950 Pa)	3.8" (950 Pa)	3.6" (900 Pa)
3000'	4.1" (1025 Pa)	3.7" (925 Pa)	3.8" (950 Pa)	3.5" (875 Pa)
3500'	4.1" (1025 Pa)	3.7" (925 Pa)	3.8" (950 Pa)	3.5" (875 Pa)
4000'	4.0" (1000 Pa)	3.6" (900 Pa)	3.7" (925 Pa)	3.5" (875 Pa)
4500'	4.0" (1000 Pa)	3.6" (900 Pa)	3.7" (925 Pa)	3.5" (875 Pa)

### Fuel Consumption

Natural Gas 1500 ft<sup>3</sup>/h (42.5 m<sup>3</sup>/h)  
Propane 69.2 lb/h (31.4 kg/h)

### Electrical Rating

See specification decal on heater

### Fan

8000 cfm (3775 l/s)

### Temperature Rise

125-215 °F (70-120 °C)

### Maximum Temperature Output

293 °F (145 °C)

### Rated Flue Temperature

480°F (250 °C)

Rated vent pressure - Positive  
Category III

### Minimum Operating Temperature

-22 °F (-30 °C)

### Dimensions

LxWxH 114" x 32.5" x 77.5"  
(290 cm x 83 cm x 197 cm)

## IX1500NC

### Fuel

Natural Gas

### Input Capacity

Maximum: 1,500,000 Btuh (440 kWh)

### Inlet Pressure

Maximum 5 psi (35 kPa)  
Minimum 9" W.C. (2.2 kPa)

### Manifold Pressure

Altitude	Max / Min
0' - 2000'	4.5" (1125 Pa)
2500'	4.3" (1075 Pa)
3000'	4.2" (1050 Pa)
3500'	4.2" (1050 Pa)
4000'	4.1" (1025 Pa)
4500'	4.1" (1025 Pa)

### Fuel Consumption

Natural Gas 1500 ft<sup>3</sup>/h (42.5 m<sup>3</sup>/h)

### Electrical Rating

See specification decal on heater

### Fan

8000 cfm (3775 l/s)

### Temperature Rise

170-215 °F (95-120 °C)

### Maximum Temperature Output

293 °F (145 °C)

### Rated Flue Temperature

480°F (250 °C)

Rated vent pressure - Positive  
Category III

### Minimum Operating Temperature

-22 °F (-30 °C)

### Dimensions

LxWxH 114" x 32.5" x 77.5"  
(290 cm x 83 cm x 197 cm)

# Installation

The Sure Flame Model IX1500/IX1500L/IX1500NC is an indirect-fired gas heater intended to be used primarily for the temporary heating of buildings under construction, alteration or repair. Since the products of combustion are released, it is imperative that the flue stack is extended outside of the enclosed area when the heater is positioned indoors. The flow of supply air and exhaust gasses must not be obstructed in any manner.

The equipment shall be installed in accordance with the National Fuel Code, ANSI Z223.1/NFPA 54, and/or the Natural Gas and Propane Installation Code CSA B149.1, and applicable local regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

The heater shall be used in a horizontal position on a firm, non-combustible surface.

The electrical grounding of the appliance shall be in compliance with National Electrical Code, ANSI/NFPA 70, or the CSA C22.1, Canadian Electrical Code, Part I

**Warning:** The installation and maintenance of the heater must be accomplished by a qualified service person. The heater should be inspected before each use and at least annually.

**Warning:** Do not use this heater in a space where gasoline or other liquids with flammable vapours are stored or used.

## Clearances

Clearance required for combustibles:

Front Outlet:	20 ft	(6 m)
Sides:	2 ft	(0.6 m)
Intake:	2 ft	(0.6 m)
Top:	5 ft	(1.5 m)
Ducts:	1 ft	(0.3 m)
Floor:	Noncombustible	

Minimum clearance required to LP Gas containers:

Outlet:	25 ft (7.6 m)
Top & Sides:	10 ft (3.0 m)

Position heater properly on a horizontal surface before use.

The hose assembly shall be protected from traffic, building materials and contact with hot surfaces both during use and while in storage. For use with or without ductwork. Only ductwork supplied by the manufacturer shall be used with this heater. For either indoor or outdoor use. Adequate ventilation must be provided. This heater is for operation at a temperature rise from 125°F to 215°F (70°C to 120°C).

All gas inspection authorities in Canada require that the installation and maintenance of heaters and accessories shall be accomplished by qualified gas fitters.

Installation must comply with the *Natural Gas and Propane Installation Code, CSA B149.1*.

## Ducting

The IX1500 series can be ducted on both the inlet and outlet. The inlet duct can be up to 50' of smooth 24"x24" metal duct. The outlet duct shall be of a material able to withstand temperatures of up to 450F. Total outlet duct length may be up to 300' of straight, smooth, insulated metal duct 24"x24". For each elbow, the allowable length is reduced by 50'.

## Venting

The flue material is to be constructed of a **Type B (Type BH in Canada), Category III** venting material. The vent connector should be designed for a positive pressure and be constructed from material having corrosion resistance and durability to heat at least equivalent to that of No. 24 GSG galvanized steel. The venting system must be in accordance with the Installation Codes for Gas Burning Appliances and Equipment, As well as other local Regulations that may apply.

<b>Flue Diameter</b>	<b>12"</b>	<b>10"†</b>
Min. vertical height	15'	20'
Max. lateral length*	15'	0'
Max. # of added elbows**	2	0

\*Lateral lengths must have a minimum 10% rise.

\*\* A minimum vertical length of 3' is required before the first elbow and after the last elbow.

† A minimum 3' of 12" vertical flue should be installed before reducing to smaller diameters.

Consult the manufacturer for additional venting options.

## Gas Connections

Ensure the correct regulator is used to supply the heater with maximum inlet pressure of 5 psi. Excessive pressure will damage components and void the warranty.

Visually inspect the fuel supply hose assembly. Ensure that it is protected from traffic, building materials, and contact with hot surfaces. Replace if there is evidence of excessive wear or abrasion.

After installation, check for gas leaks by applying a soapy solution at each piping and hose assembly connection.

## **INSTALLATION USING A PROPANE SUPPLY TANK**

- 1 When installing the heater for use with propane gas, set the gas selector valve to “Propane” and lock in position.
- 2 Arrange the propane supply system to provide for vapour withdrawal from the operating container. Supplying liquid propane to the heater is dangerous and will damage the components. Another regulator must be installed on the heater to reduce the pressure from this regulator to a maximum inlet pressure of 5 psi.
- 3 Ensure that for the surrounding temperature the size and capacity of the propane supply container is adequate to provide the rated Btu/h input to the heater.
- 4 Turn off the propane supply valve at the container when the heater is not in use.
- 5 The installation must conform with local codes, or in the absence of local codes, with the *Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58* or the *Natural Gas and Propane Installation Code CSA-B149.1*.
- 6 When the heater is to be stored indoors the propane container must be disconnected from the heater and the container moved away and stored in accordance with the above national standards.

## **INSTALLATION FOR NATURAL GAS APPLICATIONS**

- 1 When installing the heater for use with natural gas, set the gas selector valve to the “Natural” position.
- 2 A regulator must be installed on the heater to ensure that the pressure to the heater does not exceed 5 psi inlet pressure.
- 3 The installation of this heater to a natural gas supply must conform with all applicable local codes, or in the absence of local codes, with the *National Fuel Gas Code ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code CSA-B149.1*.



# Operating Instructions

## Start

1. Set GAS SELECTOR VALVE to gas being used (dual-fuel models).  
**NOTE: When using Propane Gas the Selector valve must be locked in position.**
2. Ensure the firing valve (manual valve nearest the burner) is in the "ON" position.
3. Connect power. Use appropriate power supply as indicated by the ELECTRICAL RATING information.
4. Open gas supply.
5. Press and release START HEATER switch. START HEATER light will come on. Set thermostat to desired setting. Burner blower will start after about 5-30 seconds. Flame will ignite after another 20 seconds. If STOP/RESET light comes on, press STOP/RESET switch, then repeat the above sequence.
6. Heater will switch between high flame, low flame (2-stage models) and no flame as required to maintain the desired temperature.

## Stop

1. To stop, press STOP/RESET switch and turn off gas. Burner blower will stop after about 20 seconds. Main blower will stop after heat exchanger has cooled down.
2. Turn off main electrical switch after the main blower has stopped.

**Warning: Do not stop the heater by turning off the main electrical switch. Heat accumulated in the heater can damage burner or safety equipment.**

## Ventilator

1. Press START BLOWER switch. Blower will start immediately.
2. To stop, press STOP/RESET switch.

**Note: When switching between HEAT mode and BLOWER mode, unit must first be stopped by pressing the STOP/RESET switch.**

## SETTING FAN LIMIT SWITCH

The fan limit switch is factory set and should not normally need to be adjusted. If it is out of adjustment, follow these procedures:

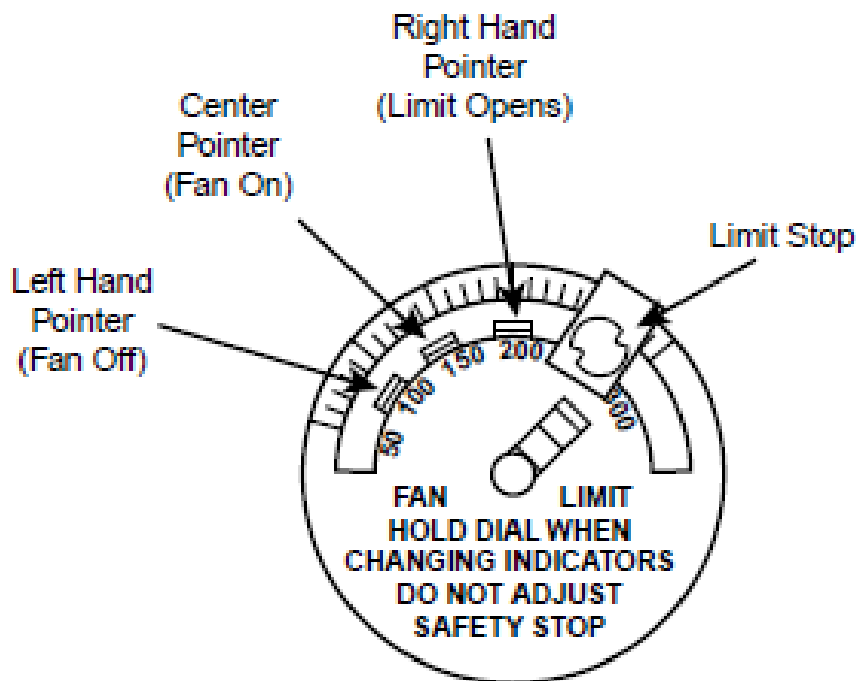
To set pointers, hold dial securely with one hand and move the pointers with the other hand. Do not force the pointers past any stops on the dial even though the dial may be graduated beyond the stops.

### Limit

Move the right hand pointer so that its straight edge indicates 300°F.

### Fan

Move the “Fan On” pointer so that its straight edge indicates 100°F. This is the temperature at which the blower will start. Move the “Fan Off” pointer so that its straight edge indicates 90°F. This is the temperature at which the blower will stop.



# Maintenance

**Warning:** Disconnect gas and electrical supplies before servicing.

## Weekly:

Gas Hose	Check for cracks and damaged connectors
Air flow	Remove any obstructions to air flow
Bearings	Lubricate bearings according to details below

## Monthly:

Cords and Connectors	Check for cracks, exposed wires, and dirt in electrical connectors
Physical Integrity	Check for damage to body, louvers, and inlet screens that may obstruct air flow and impact combustion quality
Belts	Replace belts accordingly to details below

## End of Season:

Combustion Chamber	Remove burner assembly and clean inside of combustion chamber with a wire brush. Vacuum all ash and soot from combustion chamber. Inspect combustion chamber for any damage. Do not use a heater that has a hole in the combustion chamber.
Heat Exchanger	Inspect the heat exchanger for any damage. Do not use a heater that has a hole in the heat exchanger. Remove any dust or dirt from heat exchanger enclosure with a metal brush and compressed air blower.
Burner	Remove burner from burner assembly Clean UV sensor and igniter with solvent or emery cloth. Inspect for cracked ceramic. Ensure the igniter is centered in the burner openings. Inspect wires for cracks or evidence of overheating. Ensure burner head screws are tight. Ensure gasket is in place and not damaged.
Electrical components	Check all wiring for loose, cracked, or overheated wires and connectors. Replace if necessary. Ensure ground wires are properly connected. Ensure control box seal is in place and not damaged.
Electric Motors	Wipe dirt from motors. Motors do not require lubrication.
Valve Train	Verify that manifold pressure matches the specification label. Adjust regulator pressure if necessary accordingly to details below. Inspect strainer and clean if necessary. Using soapy water or gas leak detector, check all gas connections for leaks.
Impellers	Remove any dirt build-up on both burner and blower impellers. Inspect impellers for loose or damaged fins. Run heater and check for vibration. Replace impellers that are damaged or causing vibration.
Body	Ensure all panels and shields are in place and that fasteners are tight.

## Lubricating Bearings:

**Warning:** Disconnect power before servicing bearings.

Two pairs of bearings are installed in the heater. One pair is on the burner impeller, the second is on the main blower impeller. They need to be periodically lubricated according to the schedule below. Some situations may require a change in lubricating periods as dictated by experience. Generally, a lower quantity of grease at frequent intervals is more effective than a greater quantity at extended lubrication intervals. Select a grease that is compatible with a lithium or lithium complex grease.

### Recommended Lubrication Schedule

Hours Run Per Day	Lubrication Interval in Weeks	
	Main Blower (2.7 gram per bearing)	Burner Blower (1.0 gram per bearing)
8	5	3
16	2	1
24	1	1

**Storage:** If equipment will be idle for some time, before shutting down, add compatible grease to the bearing until grease purges from the seals. This will ensure protection of the bearing, particularly when exposed to severe environmental conditions. After storage period, add fresh grease to the bearings before starting.

## Replacing Belts:

**Warning:** Disconnect power before servicing belts.

There are two belt locations. The main blower uses a double belt transmission. It requires the belts to be paired, and both need to be changed at the same time. Ensure that the blower belt tensioner is in place and set at 25°-30°, and that the tensioner roller is running smoothly. Replace if worn.

Burner blower belt tension must be set according to the belt manufacturer's specification. When replacing belts, also inspect sheaves for wear and misalignment. Replace if worn. With burner shroud in place and heater operating, look and listen for any unusual vibration or sound. A well maintained drive will operate smoothly and quietly.

## Adjusting Manifold Pressure:

Remove valve cover. Connect manometer to the port on the inlet flange of the regulator. While heater is operating, verify that the inlet pressure is between 9" WC and 5 psi. Connect manometer to manifold pressure tap on burner gas supply line. Ensure that the gas selector valve is set to the proper fuel. While the heater is operating check the manifold pressure. If the manifold pressure differs from specifications, re-adjust.

**Single stage models:** The adjusting screw is located on top of shutoff valve. Use 2.5mm Allen wrench.

**Dual stage models:** With thermostat set to high flame, adjust manifold pressure on **gas regulator** using screwdriver (adjusting screw located under black cup). Then switch the heater to low flame and adjust manifold pressure on **second stage shutoff valve** turning black wheel (to increase turn counterclockwise). Lock the wheel by tightening small screw in front knob.

Reinstall valve cover, remove the manometer and securely tighten the manifold pressure tap.

## Troubleshooting

The troubleshooting section has been divided in to six tables. Choose the appropriate table from the list below:

Chart A – Burner blower does not start, Flame does not start,

Chart B – Burner blower starts, Flame does not start,

Chart C – Burner blower starts, Flame starts but goes out after a few seconds,

Chart D – Burner blower starts, Flame starts, but fails during operation

Chart E – Burner blower starts, Flame starts, but main blower does not

Chart F – Other problems

**A – Burner blower does not start, Flame does not start,**

Green Start Push Button	Red Stop Push Button	Blue Fan Push Button	Symptoms	Possible Problem
OFF	OFF	OFF	No thermostat power light (when applicable); No Green POWER & RUN LED on OMRON controller; No power on secondary side of step down transformer (check for 120VAC on X1 to X2 terminal of the step down transformer)	<ul style="list-style-type: none"> <li>No electrical supply</li> <li>Main power switch off</li> <li>Transformer failure</li> <li>Control box circuit breaker is OFF</li> <li>Overload in control circuit</li> <li>Omron controller defective</li> <li>High voltage - wrong power source</li> <li>Wrong voltage connection on the transformer</li> </ul>
			Heater will not start; No green light. Secondary side of step down transformer has 120VAC	<ul style="list-style-type: none"> <li>Start switch (green) failure</li> </ul>
			Heater will not run in Blower only mode. Blower does run when fan/limit switch is set to manual	<ul style="list-style-type: none"> <li>Blower switch (blue) fails to make the contact</li> </ul>
			Heater will not start; Main Blower cannot be turned on manually	<ul style="list-style-type: none"> <li>Omron controller failure (error red LED)</li> </ul>
OFF	OFF	INT 2**■	Heater will not start; Main Blower cannot be turned on manually	<ul style="list-style-type: none"> <li>Fan &amp; heat button pressed together. (Push "Stop Button to reset)</li> </ul>
OFF	OFF	INT 3***■	Neither the heater or the fan start	<ul style="list-style-type: none"> <li>Stop switch (red) failure. Contacts welded or push button jammed</li> </ul>
			Main blower starts to run right after power is turn on; After 30 seconds blower turns off	<ul style="list-style-type: none"> <li>Blower switch (blue) failure. Contacts welded or push button jammed.</li> </ul>
			Heater starts; After 30 second Burner turns off;	<ul style="list-style-type: none"> <li>Start switch (green) failure. Contacts welded or button jammed</li> </ul>
INT 0.5s	SOLID	OFF	Flame controller stays in "P" position with error light on.	<ul style="list-style-type: none"> <li>Burner motor failure;</li> <li>Wrong voltage;</li> <li>Burner fan failure or foreign object in fan mechanism.</li> </ul>
			Flame controller stays in "◀" position with error light on.	<ul style="list-style-type: none"> <li>Air switch NC-contact is open after burner blower stops or burner blower fails to stop.</li> </ul>
			Flame controller stays in "◀" position with error light on. Gas odor.	<ul style="list-style-type: none"> <li>Both Solenoids valve fails to close</li> <li>Flame not extinguished.</li> </ul>
SOLID	OFF	OFF	No reaction from thermostat, but works with jumper plug.	<ul style="list-style-type: none"> <li>Defective thermostat</li> </ul>
			No function from Flame controller (fuse burned out and/or wrong voltage on transformer X1 to X2 terminal)	<ul style="list-style-type: none"> <li>High voltage (Wrong power source</li> <li>Wrong voltage setting on the transformer)</li> </ul>
			Flame controller stays in "◀" position error	<ul style="list-style-type: none"> <li>Exhaust Hi limit switch defective</li> <li>Heater Hi limit switch defective</li> <li>Overheated Hi limit switches</li> </ul>

**B - Burner blower does start, Flame does not start,**

Green Start Push Button	Red Stop Push Button	Blue Fan Push Button	Symptom	Possible Problem
INT 0.5s	SOLID	OFF	Flame controller stay in “▲” position with error light on.	<ul style="list-style-type: none"> <li>• Interruption of startup sequence. Flame controller jumper (terminals 6-7-8) disconnected</li> </ul>
			Flame controller stay in “P” position with error light on.	<ul style="list-style-type: none"> <li>• No air pressure indication</li> <li>• Air tube leaking or disconnected</li> <li>• Air switch adjusted too high</li> <li>• Air tubes plugged in wrong position (“-“ instead of “+”)</li> <li>• Air switch defective (NO contacts stay open when burner blower is working)</li> </ul>
			Flame controller stay in “■” position with error light on.	<ul style="list-style-type: none"> <li>• Flame supervision problem (UV sensor shorted)</li> <li>• Defective flame rod circuit (short, dew in burner chamber);</li> <li>• Defective Flame controller</li> </ul>
			Flame controller stay in “1” position with error light on.	<ul style="list-style-type: none"> <li>• Inlet pressure too high (over 5 psi) regulator damaged</li> <li>• Solenoid valve damaged or valve electric circuit defective</li> <li>• Gas pressure too low</li> <li>• Manual cut off valve closed</li> <li>• Interruption in flame continuity</li> <li>• Strainer plugged or dirty</li> </ul>
SOLID	OFF	OFF	Burner motor runs and Flame controller dial turns thru cycles without starting up the burner	<ul style="list-style-type: none"> <li>• Low voltage (Burner blower overload)</li> <li>• Wrong voltage setting on the transformer (check for 120VAC on X1 to X2 terminal of the step down transformer);</li> </ul>
SOLID	INT 2S***■	OFF	Burner motor runs and Flame controller dial turns thru cycles without starting up the burner	<ul style="list-style-type: none"> <li>• Low Voltage (too long or too light power cord; Wrong power source)</li> </ul>
SOLID 30 sec OFF	OFF	INT 3***■	The green push button turns on immediately after powering up the heater. The heater starts and shuts down after 30sec	<ul style="list-style-type: none"> <li>• Start switch (green) failure. Contacts welded or push button jammed.</li> </ul>





**C - Burner blower does start, Flame does start but goes out after a few seconds**

Green Start Push Button	Red Stop Push Button	Blue Fan Push Button	Symptom	Possible Problem
INT 0.5s	SOLID	OFF	Flame controller stay in “1” position with error light on	<ul style="list-style-type: none"> <li>• UV Sensor failure</li> <li>• Flame Rod failure</li> <li>• Improper Grounding</li> <li>• Back pressure in exhaust system</li> </ul>
			Damaged burner bearings; Burner motor overloaded; Burner fails to stay lit	<ul style="list-style-type: none"> <li>• Burner blower belt too tight</li> </ul>

**D - Burner blower does start, Flame does start, but fails during operation.**

Green Start Push Button	Red Stop Push Button	Blue Fan Push Button	Symptom	Possible Problem
OFF	OFF	OFF	Omron controller red error light on.	<ul style="list-style-type: none"> <li>• Too much load on power supply</li> <li>• Low Voltage</li> </ul>
OFF	OFF	INT 1***■	Noisy blower operation; Overload on power relay;	<ul style="list-style-type: none"> <li>• Damaged bearings</li> <li>• Blower Belt too tight</li> </ul>
OFF	OFF or SOLID	OFF	Poor quality power (Dirty power such as from a generator)	<ul style="list-style-type: none"> <li>• Heater will fail to stay lit; Heater turns off (Excessive motor noise)</li> </ul>
INT 0.5s	SOLID	OFF	Noisy burner operation; Irregular flame (burner observation window); Heater turns off ;	<ul style="list-style-type: none"> <li>• Burner orifices plugged or dirty</li> </ul>
INT 0.5s	SOLID	OFF	Heater starts ok but fails in function	<ul style="list-style-type: none"> <li>• Too much load on power supply</li> <li>• Low Voltage</li> <li>• Propane tank too small - not able to vaporize fast enough; tank freezes up.</li> <li>• Too small of a hose, too long of a hose, blocked hose; Too low of an inlet pressure</li> </ul>
INT 0.5s	SOLID	OFF	Yellow flame and rumbling burner operation POSSIBLE EXPLOSION	<ul style="list-style-type: none"> <li>• Liquid propane entering heater</li> <li>• Damaged regulator</li> <li>• Damaged solenoid valve</li> </ul>
INT 0.5s	SOLID	OFF	Combustion unstable, burner fails to stay lit, low outlet air temperature	<ul style="list-style-type: none"> <li>• Changeover valve set to propane when connected to natural gas</li> </ul>
INT 0.5s	SOLID	OFF	Combustion unstable, rumbling noises, burner fails to stay lit, high outlet air temperature	<ul style="list-style-type: none"> <li>• Changeover valve set to natural gas when connected to propane.</li> </ul>
INT 0.5s	SOLID	OFF	Burner doesn't cycle ; The heater runs through one cycle and then turns off;	<ul style="list-style-type: none"> <li>• Fan/limit switch limit contact fails to break; Heater High limit switch opens;</li> <li>• Heater Hi limit switch failure – too sensitive</li> </ul>




INT 0.5s	SOLID	OFF	Main blower does not cycle, Burner cycles and then turns off.	<ul style="list-style-type: none"> <li>Fan limit switch failure, Contacts fail to close</li> <li>Fan limit switch, limit set point too high. Hi limit switch opens</li> </ul>
INT 0.5s	SOLID	OFF	Flame sense error	<ul style="list-style-type: none"> <li>Exhaust Hi limit switch fails to break. Too long or too small diameter vent pipe; air-starved flame;</li> <li>Too much back pressure in exhaust system. Too long or too small vent pipe. Exhaust Hi limit switch stopped the function</li> <li>Unstable burner, yellow flame</li> </ul>
INT 0.5s	SOLID	OFF	Burner will fail to stay lit at start up or soon after with no/or very sort exhaust pipe(neon light ON)	<ul style="list-style-type: none"> <li>Exhaust Hi limit switch failure – too sensitive</li> </ul>
INT 0.5s	SOLID	OFF	Flame controller in “2” position with error light on	<ul style="list-style-type: none"> <li>Interruption in gas delivery</li> <li>clogged filter or strainer;</li> <li>defective safety solenoid valves</li> <li>gas regulator vent is plugged</li> </ul>
SOLID	INT 1S** 	INT 1* 	Heater starts ok but fails in function:	<ul style="list-style-type: none"> <li>Too much load on power supply</li> <li>Main blower motor or burner motor overloaded;</li> <li>Low Voltage</li> </ul>
SOLID	INT 2S*** 	INT 1* 	Burner starts ok but quits when Main blower attempts to start.	<ul style="list-style-type: none"> <li>Too long or too light power cord</li> <li>Low Voltage</li> </ul>

### E - Burner blower starts, Flame starts, but main blower does not

Green Start Push Button	Red Stop Push Button	Blue Fan Push Button	Symptom	Possible Problem
SOLID	OFF	OFF	Main blower fails to start; The burner cycles often; signs of overheating, discolored paint. (Main blower works when manual blue button is pressed)	<ul style="list-style-type: none"> <li>Fan limit switch, fan contacts fail to close</li> </ul>
SOLID	OFF	OFF	Main Blower motor failure	<ul style="list-style-type: none"> <li>Wrong voltage; Foreign object in fan mechanism; Fan failure</li> </ul>
SOLID	OFF	OFF	No air blows when blower button pressed (motor turns); Visible damage to blower belt; Belt tensioner not functioning properly	<ul style="list-style-type: none"> <li>Blower Belt broken</li> </ul>

**F - Other problems**

<b>Green Start Push Button</b>	<b>Red Stop Push Button</b>	<b>Blue Fan Push Button</b>	<b>Symptom</b>	<b>Possible Problem</b>
SOLID	OFF	OFF	Main Blower and/or Burner Blower spin in reverse; Low volume air coming from blowers; – yellow flame and rumbling burner operation (unstable burner) or (neon light ON)	<ul style="list-style-type: none"> <li>Wrong Phase (3 PH-reversed phase)</li> <li>Incorrect wiring on motor</li> </ul>
SOLID	OFF	OFF	Low temperature output , High CO Combustion unstable, rumbling burner operation and/or burner turns of turns off moments later;	<ul style="list-style-type: none"> <li>Changeover valve set to propane when connected to natural gas (if applicable)</li> </ul>
SOLID	OFF	OFF	High temperature output , High CO, Fan limit switch –Limit control cycles; Yellow flame;	<ul style="list-style-type: none"> <li>Changeover valve set to natural gas when connected to propane. (if applicable)</li> </ul>
SOLID	OFF	OFF	Heater will not turn off by pressing the stop button	<ul style="list-style-type: none"> <li>Stop switch (red) fails to closed</li> </ul>
SOLID	OFF	OFF	Main blower works for a long time after the burner's turned off or never stops. Blowing cold air.	<ul style="list-style-type: none"> <li>Fan limit switch, fan break set point set too low or Intake temperature too high</li> </ul>
SOLID	OFF	OFF	Main blower starts after a long delay, and cycles many times at shutdown.	<ul style="list-style-type: none"> <li>Fan limit switch, fan break set point set too high</li> </ul>
SOLID	OFF	OFF	Main blower starts after a long delay, signs of overheating, discolored paint.	<ul style="list-style-type: none"> <li>Fan limit switch, fan make set point set too high</li> </ul>
SOLID	OFF	OFF	Main blower starts to soon; blowing cold air for long time at start up.	<ul style="list-style-type: none"> <li>Fan limit switch, fan make set point set too low</li> </ul>
SOLID	OFF	OFF	The burner cycles often; Average output temperature lowered.	<ul style="list-style-type: none"> <li>Fan limit switch, limit set point too low</li> </ul>
SOLID	OFF	OFF	Blower working all the time;	<ul style="list-style-type: none"> <li>Fan limit switch fan contacts fail to open;</li> <li>Fan button on fan limit switch is set to manual mode</li> <li>OMRON controller failure.</li> </ul>
SOLID	OFF	OFF	Unstable burner, yellow flame and Flame sense error (neon light ON)	<ul style="list-style-type: none"> <li>Exhaust Hi limit switch fails to break. Too long or to small vent pipe</li> </ul>
SOLID	OFF	OFF	Blower motor runs continually as soon as the power switch is on	<ul style="list-style-type: none"> <li>Blower motor relay contacts welded</li> </ul>
SOLID	OFF	OFF	No output temperature variation from low fire to high fire	<ul style="list-style-type: none"> <li>Stage I valve not adjusted to a lower value (if applicable)</li> <li>Appliance regulator adjusted to a lower value</li> </ul>

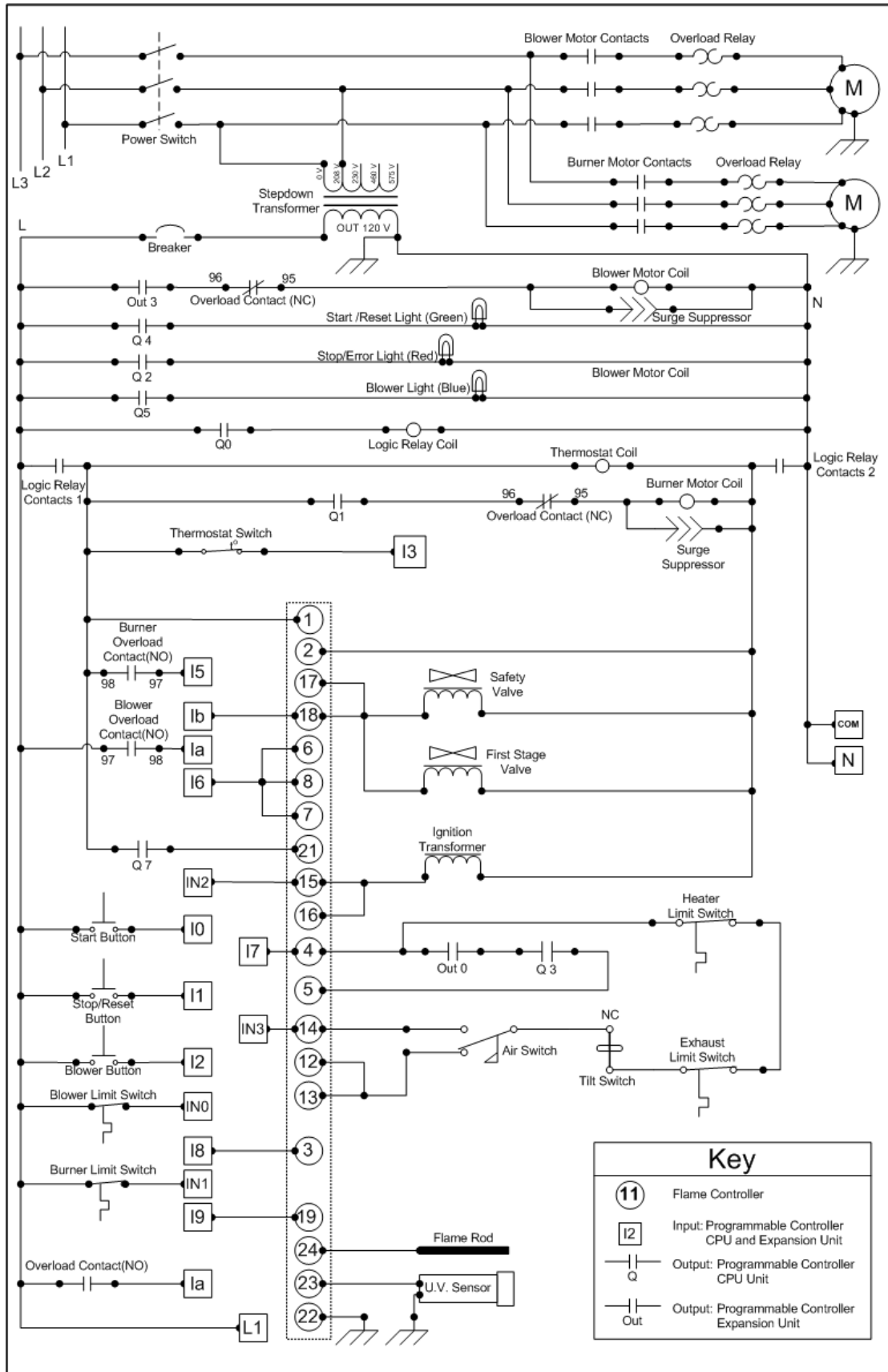
SOLID	OFF	OFF	Noisy burner fan operation; Yellow flame and high CO generation	<ul style="list-style-type: none"> <li>• Burner blower belt too loose</li> </ul>
SOLID	OFF	OFF	Noisy fan operation; High vibration; Structural damage to fan and/or bearing	<ul style="list-style-type: none"> <li>• Damaged or unbalanced fan blade</li> </ul>
SOLID	OFF	OFF	Fan limit switch, limit switch opens; Burner cycles more often	<ul style="list-style-type: none"> <li>• Inlet duct too long.</li> <li>• Outlet duct too long</li> </ul>
SOLID	OFF	OFF	Noisy operation; heater body vibration;	<ul style="list-style-type: none"> <li>• Heater not positioned on a level surface</li> </ul>
SOLID	OFF	OFF	Fan limit switch – Limit control opens;	<ul style="list-style-type: none"> <li>• Wrong Phase (3 PH-reversed phase)</li> </ul>
SOLID	OFF	OFF	Static charge ; Static shocks; UV Flame detection works ok	<ul style="list-style-type: none"> <li>• Improper grounding</li> </ul>
SOLID	OFF	OFF	Heater working all the time (doesn't react to adjusted temperature on the thermostat) – stops if thermostat is disconnected;	<ul style="list-style-type: none"> <li>• Thermostat failure</li> </ul>
SOLID	INT 0.5 S* 	OFF	The heater runs properly; intermittent 0.5 sec red light	<ul style="list-style-type: none"> <li>• Burner stopped without post purge or</li> <li>• Thermostat turned on/off do to cold drafts.</li> </ul>

A120V - Always 120VAC  
S120V - Switched 120VAC



NOTE: All wires 18 Ga STR TEW 600V unless otherwise specified

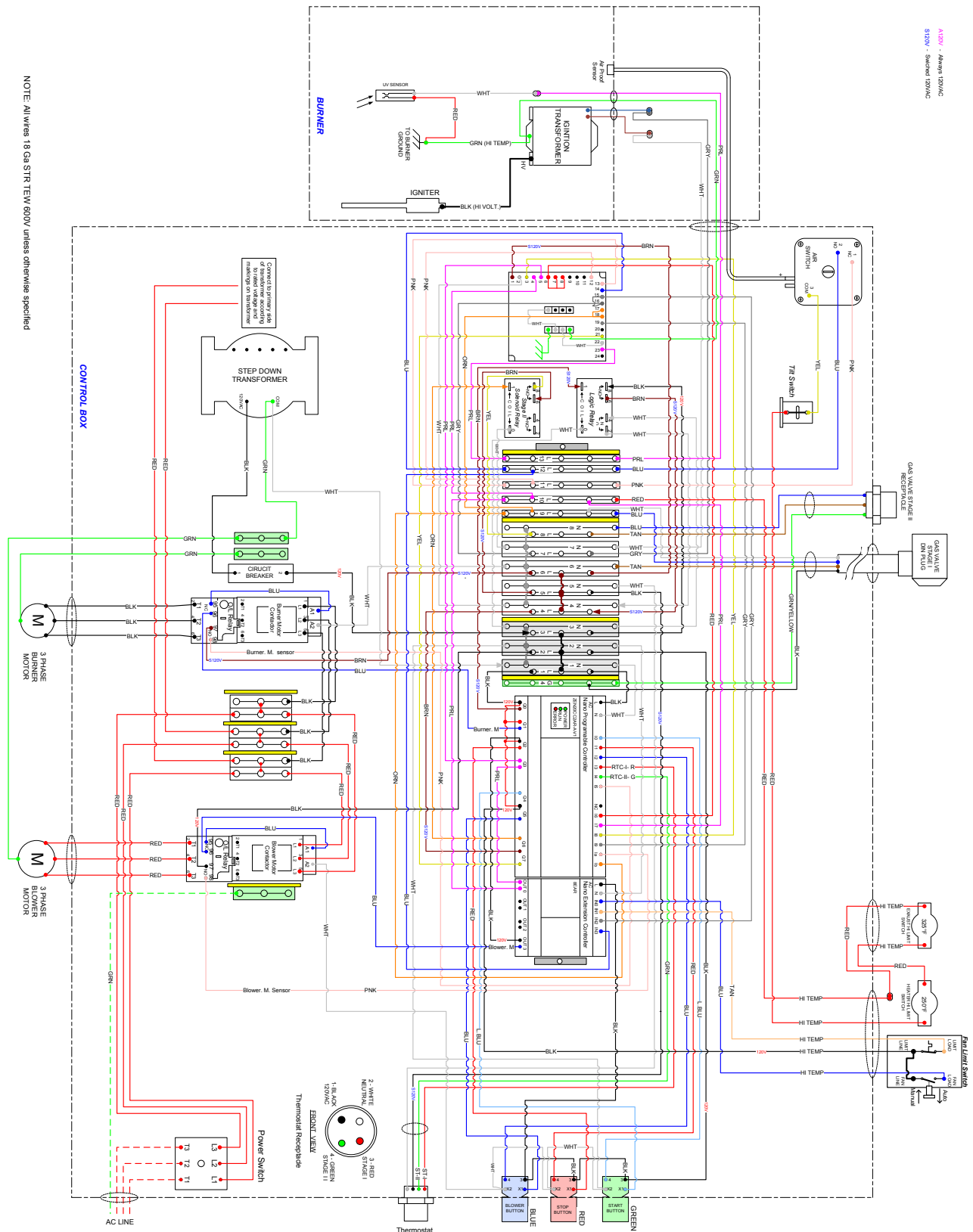
# IX1500L/IX1500NC Ladder Diagram (1 stage)



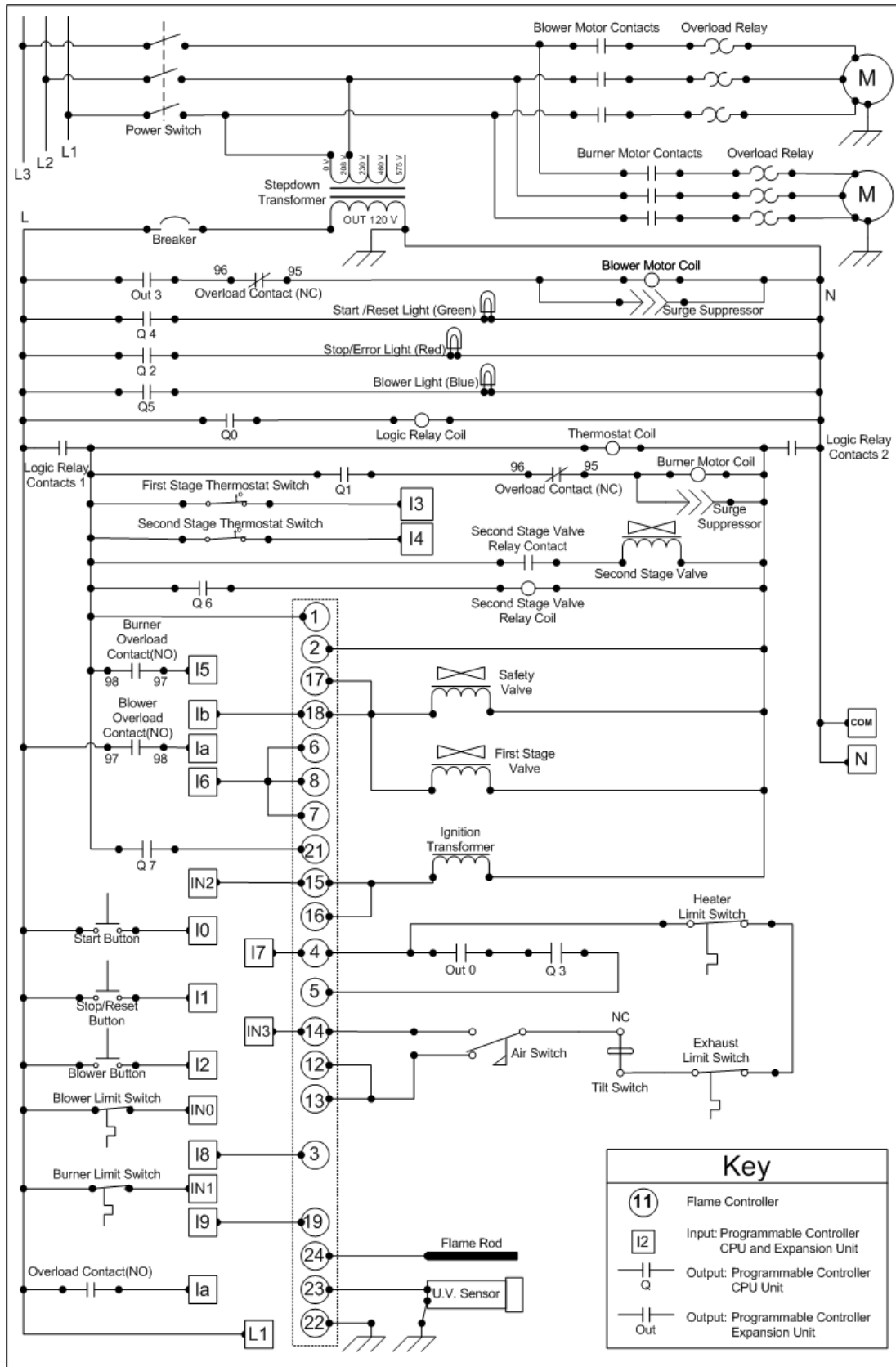
# IX1500 Wiring Diagrams (2 stage)

A120V - Always 120VAC  
S120V - Standard 120VAC

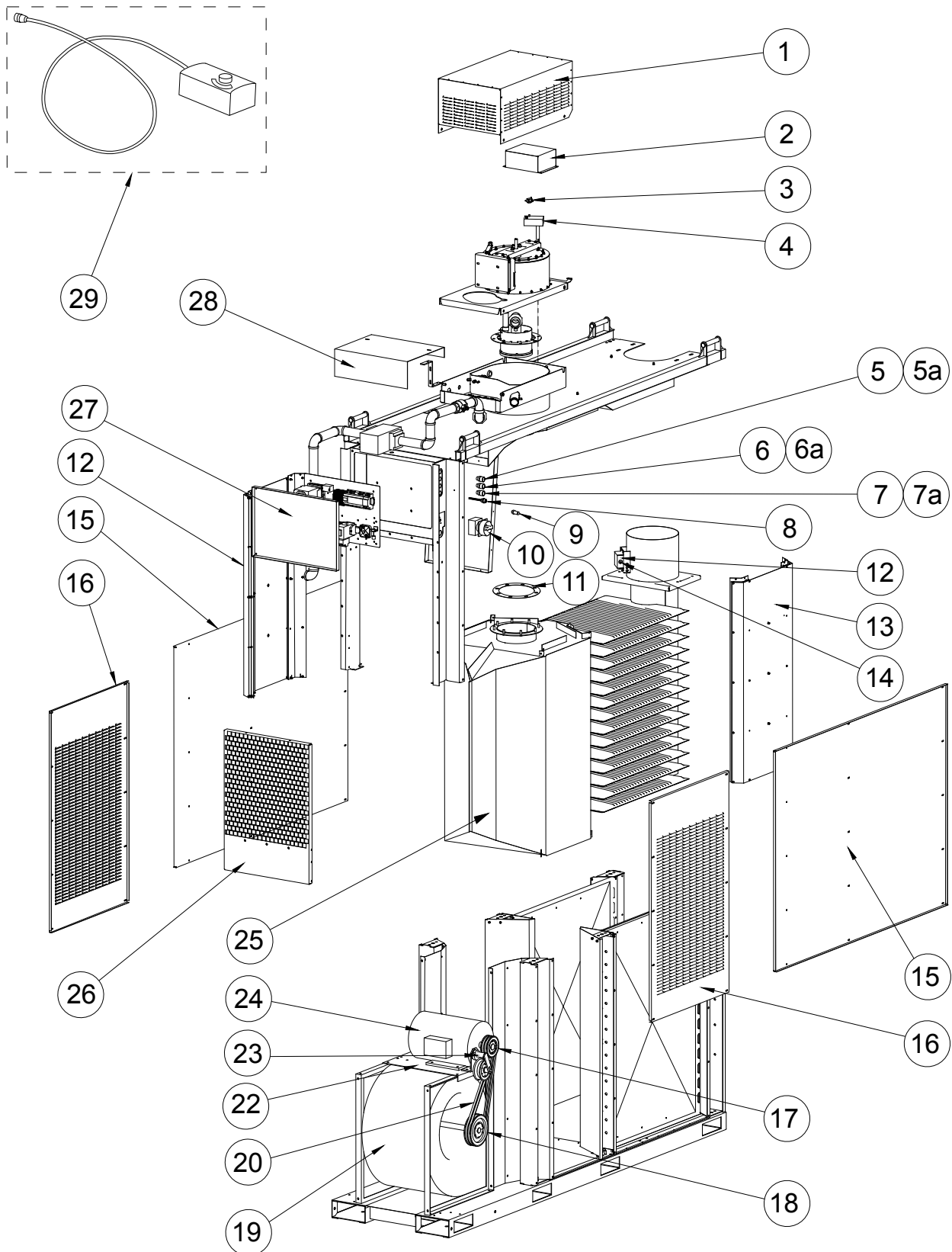
Rev 3.0



# IX1500 Ladder Diagram (2 stage)



# Main Assembly Replacement Parts

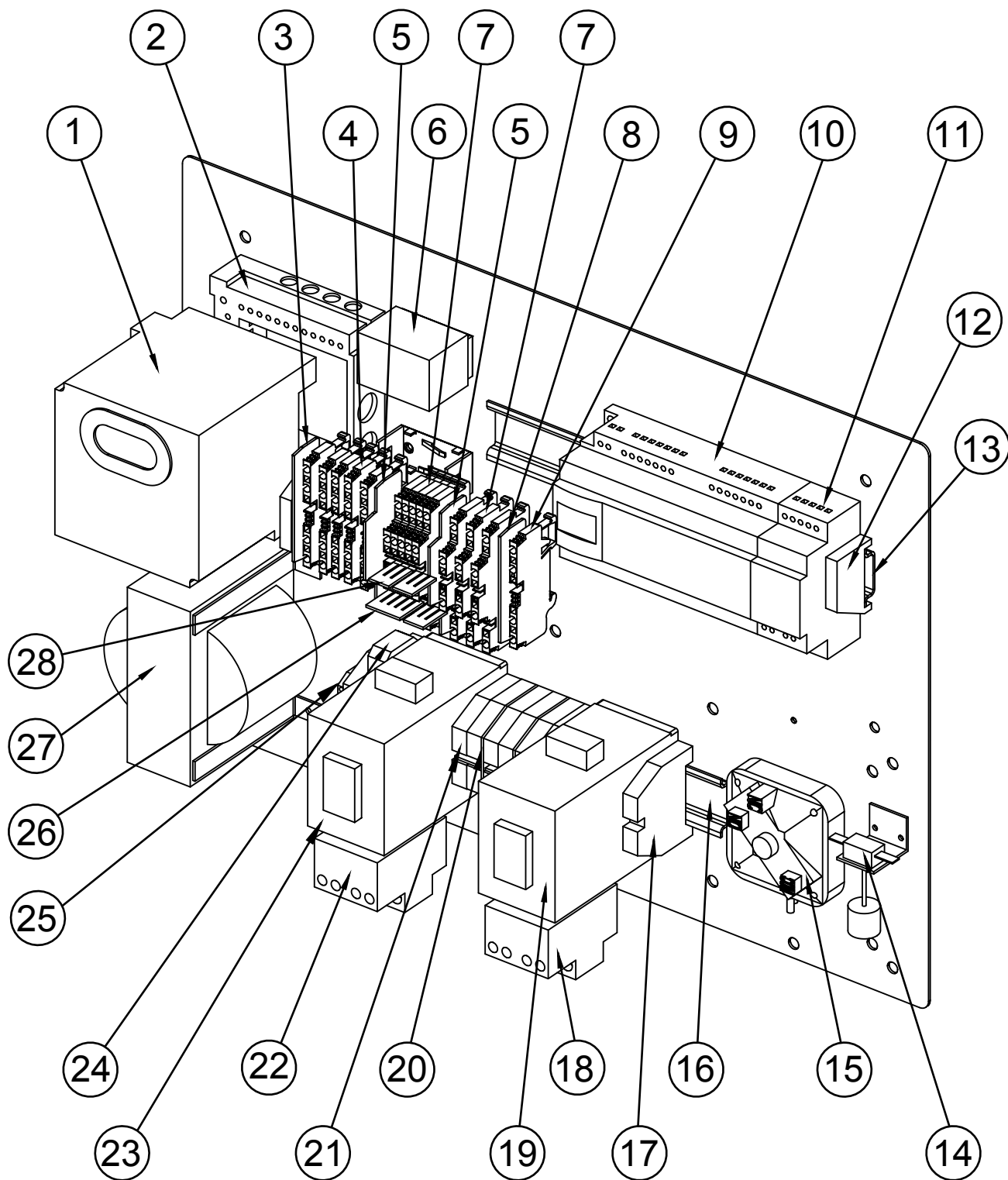




# Main Assembly Replacement Parts

Ref #	Part #	Description	Quantity
1	IX-3738	Shroud	1
2	IX-5542	Limit Switch Cover	1
3	4711	Limit Switch 250°F	1
4	4710	Fan/Limit Control	1
5	IX-5726	Start Contact Block Assembly	1
5a	9612	Start Pushbutton Green	1
6	IX-5725	Stop Contact Block Assembly	1
6a	9611	Stop Pushbutton Red	1
7	IX-5727	Blower Contact Block Assembly	1
7a	9613	Blower Pushbutton Blue	1
8	WRS-145 WRS-173	Thermostat Receptacle IX1500 Thermostat Receptacle IX1500L,NC	1
9	S1500-713 SE-4716	Thermostat Jumper Assy IX1500 Thermostat Jumper Assy IX1500L,NC	1
10	9439	Disconnect Switch	1
11	IX-3037	Burner Gasket	1
12	FN12-517	Exhaust Limit Switch Cover	1
13	IX-5741	Heat Shield & Air Deflector Assy	2
14	4712	Limit Switch 325°F	1
15	IX-5225	Combustion Chamber Panel	2
16	IX-5022	Outside Blower Panel	2
17	1097	Motor Sheve	1
18	1096	Blower Sheve	1
19	4709	Blower	1
20	4564	Belt	2
22	IX-5243	Motor Mounting	1
23	IX-5781	Belt Tensioner Assembly	1
24	4716	Blower Motor (208/230/460V)	1
25	IX-4552	Combustion Chamber/Exchanger	1
26	IX-5250	Inlet Screen	1
27	IX-5037	Control Box Cover	1
28	IX-5040	Valve Cover	1
29	S1500-714 SE-4715	Thermostat Assembly IX1500 Thermostat Assembly IX1500L,NC	1

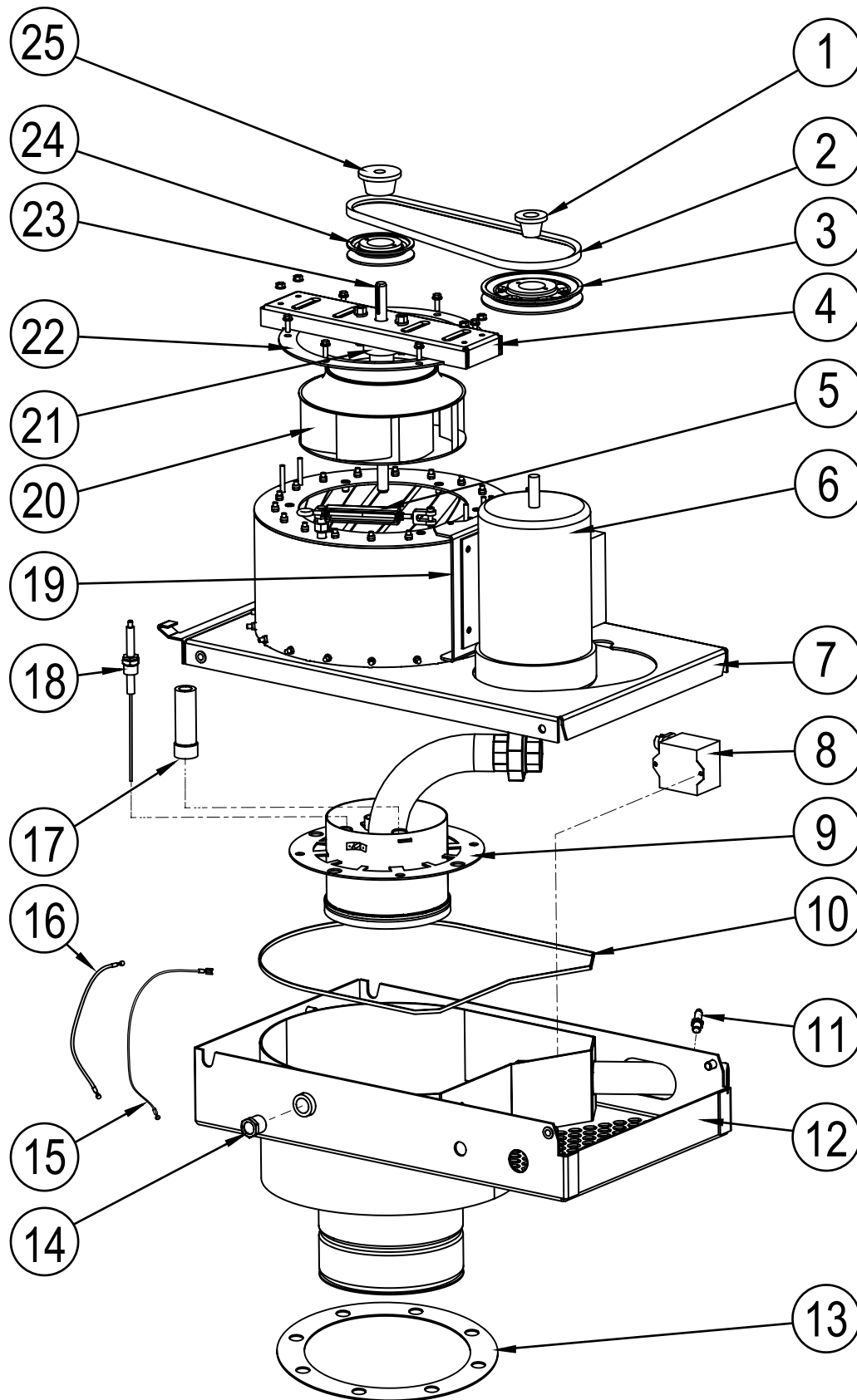
# Control Box Replacement Parts



# Control Box Parts List

Ref #	Part #	Description	Quantity	
			IX1500	IX1500L,NC
1	8677	Flame Controller	1	1
2	8678	Flame Controller Base	1	1
3	4657	End Plate	1	1
4	4669	Terminal Block	5	5
5	4654	End Plate	2	2
6	9264	Relay	2	1
7	4658	Terminal Block	8	8
8	4655	End Plate Green	1	1
9	4668	Ground Terminal Block	1	1
10	9569	Programmable Controller	1	1
11	9568	Controller Extension	1	1
12	8651	Din Rail End Bracket	2	2
13	IX-5238	DIN Rail Top	1	1
14	4565	Pendulum Switch	1	1
15	IX-5709	Adjusted Air Switch	1	1
16	IX-5237	DIN Rail Bottom	1	1
17	9442	Ground Terminal Block	1	1
18	9938	Blower Overload Relay	1	1
19	8629	Blower Contactor	1	1
20	9444	End Plate	4	4
21	9440	Terminal Block	6	6
22	4717 (208/230V) 4718 (460/575V)	Burner Overload Relay	1	1
23	4719	Burner Contactor	1	1
24	4703	Circuit Breaker	1	1
25	9443	Ground Terminal Block	2	2
26	4622	Terminal Jumper 5-Pole	1	1
27	2502	Stepdown Transformer	1	1
28	4652	Terminal Jumper 3-Pole	3	3

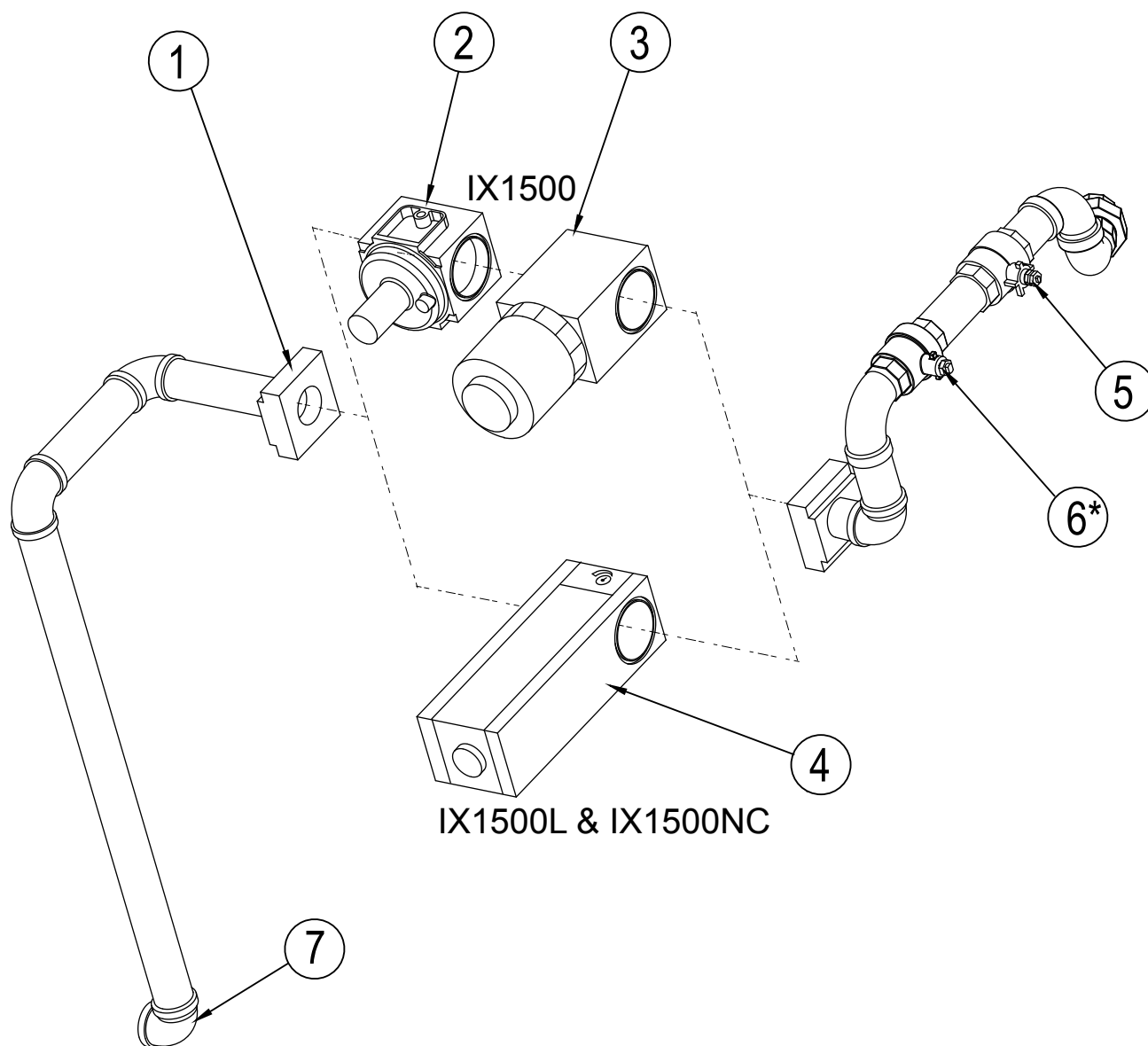
## Burner Assembly Replacement Parts



# Burner Assembly Parts List

Ref #	Part #	Description	Quantity
1	7751	Motor Bushing	1
2	1087	Burner Belt	1
3	9556	Motor Sheave	1
4	IX-3517	Bearing Mount	1
5	IX-3715	Turnbuckle Assembly	1
6	9453	Burner Motor (208/230/460)	1
7	IX-3739	Blower Housing	1
8	8676	Ignition Transformer	1
9	IX-3712 IX-3740	Burner Head Assembly IX1500(L) Burner head Assembly IX1500NC	1
10	1093	Trim Seal Band	5'
11	8708	Test Nipple	1
12	IX-3512	Burner Housing	1
13	IX-3037	Burner Gasket	1
14	9475	Observation Port	1
15	WR9GER-18	Hi Temp. Ground Wire	1
16	WR1XX-30	Ignition Wire	1
17	9005	UV Flame Sensor	1
18	9407	Flame/Spark Rod	1
19	IX-3057	Motor Mount	1
20	4708	Fan Wheel	1
21	9411	5/8" Flange Bearing Unit	2
22	4707	Inlet Cone	1
23	IX-3902	Burner Impeller Shaft	1
24	7746	Impeller Sheave	1
25	6133	Impeller Bushing	1
	IX-3257	Flame Viewing Reflector (not Shown)	1

## Valve Train Replacement Parts



Ref #	Part #	Description	Quantity
1	4723	1-1/2" NPT Flange	2
2	8685	Gas Regulator	1
3	8648	Second Stage Shutoff Valve	1
4	4725	Combination Valve	1
5	2539	1-1/2" Ball Valve	1
6	IX-3733	Changeover Valve (*not use in IX1500NC)	1
7	SL11B-715	1-1/2" Strainer Assembly	1

## LPG - PROPANE FUEL VAPORIZATION RATE

The following chart shows the amount of BTU's that various sizes of tanks will produce on the average at specific temperatures and regular atmospheric conditions.

Tank Size Gallons (Pounds)	Maximum intermittent withdrawal rate (BTU/hr) without tank frosting* if lowest outdoor temperature (average for 24 hours) reaches.							
	+40 F.	+30 F.	+20 F.	+10 F.	0 F.	-10 F.	-20 F.	-30 F.
150 (600)	214,900	187,900	161,800	148,000	134,700	132,400	108,800	107,100
250 (1000)	288,100	251,800	216,800	198,400	180,600	177,400	145,800	143,500
500 (2000)	478,800	418,600	360,400	329,700	300,100	294,800	242,300	238,600
1000 (4000)	852,800	745,600	641,900	587,200	534,500	525,400	431,600	425,000

\* Frosting on the outside of the tank acts as an insulator, reducing the vaporization rate.

## MAXIMUM BTU CONTENT (PROPANE)

The following table shows the maximum BTU's that a cylinder contains.

CYLINDER SIZE	BTU CONTENT
100 pound	2,159,100
250 gallon USA	22,922,500
500 gallon USA	45,845,000
1000 gallon USA	91,690,000

**CAUTION:** In extremely cold weather it is impossible to completely empty a propane cylinder.

## PRESSURE & FLOW EQUIVALENTS

1 Std. Atmosphere =	14.73 lb./sq. in. =	1.014 bar
1" Water Column (W.C.) =	0.58 oz./sq. in. =	2.49 millibar
11" Water Column =	0.4 lb./sq. in. =	27.39 millibar
1 lb./sq. in. (psig) =	27.71" W.C. =	0.0689 bar
1" Mercury =	0.49 psig =	33.86 millibar
1 Std. Cubic Ft./Hr. =	2,500 BTU/Hr. =	0.02832 cu. m/hr.
1 BTU/Hr. =	0.2931 Watts	



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A Division of Haul-All Equipment  
4115 - 18 Avenue North  
Lethbridge, Alberta T1H 5G1  
[www.sureflame.com](http://www.sureflame.com)